IEEE P802.11
Wireless LANs

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| Resolutions for Comments Related to 320 MHz Sensing in LB276 |
| Date: 2023-11-07 |
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Abstract

This submission proposes resolutions to the following comments submitted in LB276 under Exchange topic. They are all related to 320 MHz sensing. The CIDs are referring to D2.0. The text used as reference is D2.1.

CIDs: 3349 3350 3351 3352 3367 3538

Revision history:

R0: Original version

R1: Made some changes to the Q matrix normative text to keep it consistent with the proposed changes in DCN1476.

R2: Minor editorial fixes.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CID** | **Commenter** | **Page** | **Comment** | **Proposed change** | **Proposed resolution** |
| 3349 | Cheng Chen | 148.22 | Currently in 11bf, we are using Ranging NDP as the SI2SR NDP in the NDPA sounding phase in a TB sensing measurement exchange as long as BW < = 160 MHz, but using EHT sounding NDP for BW = 32 MHz. Now that we have also defined 320 MHz EHT Ranging NDP in 11bk, we should align the use of SI2SR NDP for all bandwidths. | Replace the EHT sounding NDP with the EHT Ranging NDP for 320 MHz SI2SR NDP used in the NDPA sounding phase in the TB sensing measurement exchange. | Revised, see proposed resolution below in <DCN1949r1>. |
| 3350  | Cheng Chen | 149.47 | Currently in 11bf, the TF sounding phase SR2SI variant does not support 320 MHz. Now that 11bk has defined 320 MHz EHT TB Ranging NDP, we should consider extending the TF sounding phase SR2SI variant to support 320 MHz scenarios as well. | Extend the TF sounding phase SR2SI variant to cover 320 MHz scenarios with the use of 320 MHz EHT TB Ranging NDP. | Revised, see proposed resolution below in <DCN1949r1>. |
| 3351 | Cheng Chen | 151.42 | Currently in 11bf, the TF sounding phase SR2SR variant does not support 320 MHz. Now that 11bk has defined 320 MHz EHT Ranging NDP, we should consider extending the TF sounding phase SR2SI variant to support 320 MHz scenarios as well. | Extend the TF sounding phase SR2SR variant to cover 320 MHz scenarios with the use of 320 MHz EHT Ranging NDP. | Revised, see proposed resolution below in <DCN1949r1>. |
| 3352 | Cheng Chen | 155.20 | Currently in 11bf, the Non-TB sensing measurement exchange does not support 320 MHz. Now that 11bk has defined 320 MHz EHT Ranging NDP, we should consider extending the Non-TB sensing measurement exchange to support 320 MHz scenarios as well. | Extend the Non-TB sensing measurement exchange to support 320 MHz scenarios with the use of 320 MHz EHT Ranging NDP. | Revised, see proposed resolution below in <DCN1949r1>. |
| 3367 | Sigurd Schelstraete | 155.20 | Several sounding modes do not support 320 MHz. What is the plan for this? Should this be included in 802.11bk? | See comment | Revised, see proposed resolution below in <DCN1949r1>. |
| 3538 | Albert Petrick | 150.42 | Note states it does not support 320 MHz operation. It should state which operations are supported e.g, 80MHz, 160 MHz | As commented | Revised, see proposed resolution below in <DCN1949r1>. |

**Proposed resolution**: Revised.

***TGbf editor, make the following changes in D2.1:***

**9.3.1.22.14.3 SR2SI Sounding Trigger frame**

The format of the User Info field in the SR2SI Sounding Trigger frame is defined in Figure 9-98d (User Info field for SR2SI Sounding Trigger frame if the AID12/USID12 subfield is not equal to 2008) if the AID12/ USID12 subfield is not equal to 2008.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B11 | B12 B20 | B21 B23 | B24 B25 | B26 B31 | B32 B38 | B39 |
|  | AID12/USID12 | Reserved | SR2SI Rep | Reserved | SS Allocation/RA-RU Information | UL Target Receive Power | Reserved |
| Bits | 12 | 9 | 3 | 2 | 6 | 7 | 1 |

**Figure 9-98d --- User Info field for SR2SI Sounding Trigger frame if the AID12/USID12 sub-field is not equal to 2008**

The AID12/USID12 subfield is identical to the corresponding subfield in the Sensing Polling Trigger frame.

The SR2SI Rep field indicates the number of ~~HE-~~LTF repetitions in the corresponding HE TB RangingNDP or EHT TB Ranging NDP from the non-AP STA indicated in the AID12/USID12 subfield; the SR2SI Rep field is set to the number of ~~HE-~~LTF repetitions minus 1. The value of the SR2SI Rep field is the same in all User Info fields in a single SR2SI Sounding Trigger frame.

If the SR2SI Sounding Trigger frame is soliciting a HE TB Ranging NDP, ~~T~~the SS Allocation/RA-RU Information and UL Target Receive Power fields are identical to the corresponding fields in the HE variant User Info field of a Basic Trigger frame; see 9.3.1.22.4 (HE variant Trigger User Info filed ~~Trigger frame format~~). If the SR2SI Sounding Trigger frame is soliciting an EHT TB Ranging NDP, the SS-Allocation/RA-RU Information and UL Target Receive Power fields are identical to the corresponding fields in the EHT User Info field of a Basic Trigger frame, see 9.3.1.22.5 (EHT variant User Info field).

In both the HE variant Common Info field and the EHT variant Common Info field, the UL STBC, LDPC Extra Symbol Segment, Pre-FEC Padding Factor, and PE Disambiguity subfields are reserved.

The GI And HE-LTF Type subfield in the HE variant Common Info field is set to 1 (2x HE-LTF + 22 1.6 μs GI). The GI And HE/EHT-LTF Type subfield in the EHT variant Common Info field is set to 1 (2x EHT-LTF + 1.6 μs GI). The MU-MIMO HE-LTF Mode subfield in the HE variant Common Info field is set to 0 (HE single stream pilot HE-LTF mode).

The Doppler subfield in the HE variant Common Info field is set to 0.

The format of the User Info field in the SR2SI Sounding Trigger frame is defined in Figure 9-98e (User Info field for SR2SI/SR2SR Sounding Trigger frame if the AID12/USID12 subfield is equal to 2008) if the AID12/USID12 subfield is equal to 2008.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 B11 | B12 B27 | B28 B30 | B31 B39 |
|  | AID12/USID12 | Partial TSF | Token | Reserved |
| Bits | 12 | 16 | 3 | 9 |

**Figure 9-982 --- User Info field for SR2SI/SR2SR Sounding Trigger frame if the AID12/USID12 sub-field is equal to 2008**

If the AID12/USID12 subfield is equal to 2008, the User Info field is used to carry the Partial TSF field. The Partial TSF field contains 16 bits of the AP’s TSF time, TSF[21:6], if the AP transmitted the Sensing Polling Trigger frame that preceded the SR2SI Sounding Trigger frame carrying this User Info field.

The Token field is set to the value of the Token field of the Sensing Polling Trigger frame whose partial

transmission TSF time is carried.

The Trigger Dependent User Info field is not present in the SR2SI Sounding Trigger frame.

**9.3.1.22.14.6 SR2SR Sounding Trigger frame**

The SR2SR Sounding Trigger frame contains one Transmitter User Info field, one or more Receiver UserInfo fields, and one User Info field with the AID12/USID12 subfield set to 2008.

The format of the Transmitter User Info field is defined in Figure 9-98g (Transmitter User Info field for SR2SR Sounding Trigger frame.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B11 | B12 | B12 B20 | B21 B23 | B24 B25 | B26 B31 | B32 B38 | B39 |
|  | AID12/USID12 | TX/RX | Reserved | SR2SI Rep | Reserved | SS Allocation/RA-RU Information | UL Target Receive Power | Reserved |
| Bits | 12 | 1 | 8 | 3 | 2 | 6 | 7 | 1 |

**Figure 9-98g --- Transmitter User Info field for SR2SR Sounding Trigger frame**

The Transmitter User Info field for the SR2SR Sounding Trigger frame follows the definition of the User

Info field for the SR2SI Sounding Trigger frame except for the following:

— The TX/RX field indicates the role of the addressed sensing responder in the current SR2SR variant

of the trigger frame (TF) sounding phase. The TX/RX field in the Transmitter User Info field is set

to 0.

— The SR2SR Rep field indicates the number of ~~HE-~~LTF repetitions in the corresponding HE Ranging

NDP or EHT TB Ranging NDP from the non-AP STA indicated in the AID12/USID12 subfield; the SR2SR Rep field is set to the number of ~~HE-~~LTF repetitions minus 1.

— If the SR2SR Sounding Trigger frame is soliciting a HE TB Ranging NDP, ~~T~~the SS Allocation/RA-RU Information field and UL Target Receive Power filed are~~is~~ identical to the same fields in the HE variant User Info field of a Basic Trigger frame; see 9.3.1.22.4 (HE variant User Info field~~Trigger frame format~~) corresponding to the HE Ranging NDP from the non-AP STA indicated in the AID12/USID12 subfield in this SR2SR Sounding Trigger frame. If the SR2SR Sounding Trigger frame is soliciting an EHT TB Ranging NDP, the SS-Allocation/RA-RU Information and UL Target Receive Power fields are identical to the corresponding fields in the EHT User Info field of a Basic Trigger frame, see 9.3.1.22.5 (EHT variant User Info field) corresponding to the EHT Ranging NDP from the non-AP STA indicated in the AID12/USID12 field in the SR2SR Sounding Trigger frame.

The format of the Receiver User Info field is defined in Figure 9-98h (Receiver User Info field for SR2SR

Sounding Trigger frame).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 B11 | B12 | B13 B24 | B25 B39 |
|  | AID12/USID12 | TX/RX | TX AID12/USID12 | Reserved |
| Bits | 12 | 1 | 12 | 15 |

**Figure 9-98h --- Receiver User Info field for SR2SR Sounding Trigger frame**

The AID12/USID12 subfield is identical to the corresponding subfield in the Sensing Polling Trigger frame.

The TX/RX field indicates the role of the addressed sensing responder in the current SR2SR variant of the

TF sounding phase. The TX/RX field in a Receiver User Info field is set to 1.

The TX AID12/USID12 subfield indicates the AID/USID of the sensing transmitter in the current SR2SRvariant of the TF sounding phase. The value of the TX AID12/USID12 subfield is the same as the value of the AID12/USID12 subfield in the Transmitter User Info field.

The AID12/USID12 subfield of the Transmitter User Info field or the Receiver User Info field is not equal to 2008.

The format of the User Info field in the SR2SR Sounding Trigger frame is defined in Figure 9-98e (User

Info field for SR2SI/SR2SR Sounding Trigger frame if the AID12/USID12 subfield is equal to 2008) if the AID12/USID12 subfield is equal to 2008.

If the AID12/USID12 subfield is equal to 2008, the User Info field is used to carry the Partial TSF field. The Partial TSF field contains 16 bits of the AP’s TSF time, TSF[21:6], if the AP transmitted the Sensing Polling Trigger frame that preceded the SR2SR Sounding Trigger frame carrying this User Info field.

The Token field is set to the value of the Token field of the Sensing Polling Trigger frame whose partialtransmission TSF time is carried.

In both the HE variant Common Info field and the EHT variant Common Info field, the UL STBC, LDPC Extra Symbol Segment, Pre-FEC Padding Factor, and PE Disambiguity subfields are reserved.

The GI And HE-LTF Type subfield in the HE variant Common Info field is set to 1 (2x HE-LTF + 22 1.6 μs GI). The GI And HE/EHT-LTF Type subfield in the EHT variant Common Info field is set to 1 (2x EHT-LTF + 1.6 μs GI). The MU-MIMO HE-LTF Mode subfield in the HE variant Common Info field is set to 0 (HE single stream pilot HE-LTF mode).

The Doppler subfield in the HE variant Common Info field is set to 0.

**9.4.2.321 Sensing Capabilities element**

The Max TX STS = 160 MHz field indicates for bandwidth equal to 160 MHz the maximum number ofspace-time streams that the STA supports in the transmission of an SI2SR, SR2SI, or SR2SR NDP in TBand non-TB sensing measurement exchanges minus 1. This field is reserved if the value of the BW field is not 3 or 4.

The Max TX STS = 320 MHz field indicates for bandwidth equal to 320 MHz the maximum number ofspace-time streams that the STA supports in the transmission of an SI2SR, SR2SI, or SR2SR NDP in TB and non-TB sensing measurement exchanges minus 1. This field is reserved if the value of the BW field is not 4.

The Max RX STS = 160 MHz field indicates for bandwidth equal to 160 MHz the maximum number ofspace-time streams that the STA supports in the reception of an SI2SR, SR2SI, or SR2SR NDP in TB andnon-TB sensing measurement exchanges minus 1. This field is reserved if the value of the BW field is not 3 or 4.

The Max RX STS = 320 MHz field indicates for bandwidth equal to 320 MHz the maximum number ofspace-time streams that the STA supports in the reception of an SI2SR, SR2SI, or SR2SR NDP in TB and non-TB sensing measurement exchanges minus 1. This field is reserved if the value of the BW field is not 4.

**11.55.1.1 Overview**

~~If the bandwidth of an~~ When transmitting an SI2SR, SR2SI, or SR2SR NDP ~~is equal to 320 MHz~~, for transmission of HE/EHT-STFs and HE/EHT-LTFs, if $N\_{STS}=N\_{TX}$, the spatial mapping matrix, Q matrix, shall be an Identity matrix, which maps the first stream to the first RF chain and the first antenna element, the second stream to the second RF chain and the second antenna element, so on so forth. ~~and~~ ~~i~~If $N\_{STS}<N\_{TX}$, the Q matrix shall be based on an RF chain/antenna element selection ~~matrix~~ with no RF chain/antenna element swapping such that~~. T~~ the Q matrix becomes an Identity matrix when all 0 rows are removed. In both $N\_{STS}=N\_{TX} $and $N\_{STS}<N\_{TX}$ cases the stream to RF chain and physical antenna mapping shall be the same across all the measurement exchanges.

~~NOTE—Similar conditions apply to the transmission of SI2SR, SR2SI, or SR2SR NDPs with bandwidth less than 320 MHz per the definition of HE Ranging NDPs (see 27.3.18a.1 (HE Ranging NDP)).~~

NOTE—For example, if $N\_{STS}=2$ and $N\_{TX}=4$, one Q matrix that is compliant with the spec is $\left[\begin{array}{c}1 \\0 \\0 \\0 \end{array}\begin{array}{c}0\\1\\0\\0\end{array}\right]$, which selects the first RF chain and the first antenna element to transmit the first stream, and the second RF chain and the second antenna element to transmit the second stream. Besides, these Q matrices are also compliant with the spec: $\left[\begin{array}{c}1 \\0 \\0 \\0 \end{array}\begin{array}{c}0\\0\\1\\0\end{array}\right]$, $\left[\begin{array}{c}1 \\0 \\0 \\0 \end{array}\begin{array}{c}0\\0\\0\\1\end{array}\right]$, $\left[\begin{array}{c}0 \\1 \\0 \\0 \end{array}\begin{array}{c}0\\0\\1\\0\end{array}\right]$, $\left[\begin{array}{c}0 \\1 \\0 \\0 \end{array}\begin{array}{c}0\\0\\0\\1\end{array}\right]$, and $\left[\begin{array}{c}0 \\0 \\1 \\0 \end{array}\begin{array}{c}0\\0\\0\\1\end{array}\right]$. When all 0 rows are removed, these Q matrices all become an Identity matrix $\left[\begin{array}{c}1 0\\0 1\end{array}\right]$. One example of Q matrix that is not compliant with the spec is $\left[\begin{array}{c}0 \\1 \\0 \\0 \end{array}\begin{array}{c}1\\0\\0\\0\end{array}\right]$, which selects the second RF chain and the second antenna element to transmit the first stream, and the first RF chain and the first antenna element to transmit the second stream. When all 0 rows are removed, the $Q$ matrix becomes $\left[\begin{array}{c}0 1\\1 0\end{array}\right]$ which is not an Identity matrix.

**11.55.1.5.2.3 NDPA sounding phase**

If the bandwidth of the PPDU carrying the Sensing NDP Announcement frame is equal to 320 MHz, the format of SI2SR NDP shall be an EHT Ranging ~~sounding~~ NDP, as described in 36.3.4.1~~18~~ (EHT Ranging ~~sounding~~ NDP). The EHT LTF symbol shall use the 2x EHT-LTF with 1.6 µs GI, and the sensing transmitter shall use the EHT puncturing pattern indicated in the Disabled Subchannel Bitmap subfield of the EHT Operation element which is one of the non-OFDMA puncturing patterns defined in Table 36-30 (Definition of the Punctured Channel Information field in the U-SIG for an EHT MU PPDU using non-OFDMA transmissions) whose corresponding PPDU bandwidth value in the table is equal to the operating channel width of the BSS(#3175).

**11.55.1.5.2.4 TF sounding phase – SR2SI variant**

The format of the SR2SI NDP in the TF sounding phase of a TB sensing measurement exchange shall be a HE TB Ranging NDP if the SR2SI Sounding Trigger frame is soliciting a HE TB Ranging NDP, as described in 27.3.18a.2 (HE TB Ranging NDP). The format of the SR2SI NDP in the TF sounding phase of a TB sensing measurement exchange shall be an EHT TB Ranging NDP if the SR2SI Sounding Trigger frame is soliciting an EHT TB Ranging NDP, as described in 36.3.4.2 (EHT TB Ranging NDP).

~~NOTE—In the SR2SI variant of a TF sounding phase, 320 MHz operation is not supported.~~

In the SR2SI Sounding Trigger frame, the AP shall set the SS Allocation/RA-RU Information field and the SR2SI Rep field of the User Info fields corresponding to each of the STAs triggered by the Trigger frame as following:

— The Number of Spatial Streams to be included in each SS Allocation/RA-RU Information field shall

be less than or equal to aSensingSRTXSTS for the corresponding non-AP STA.

— All the SR2SI Rep fields in the User Info fields of the SR2SI(#3540) Sounding Trigger frame shall be set to the same value. This value indicates the number of ~~HE-~~LTF repetitions in the SR2SI NDP and shall not exceed any of the aSensingSRTXRep for the corresponding non-AP STA(s) triggered by this Sensing Sounding Trigger frame.

— The product of the number of ~~HE-~~LTF repetitions, indicated in each of the SR2SI Rep fields of the User Info fields, and the number of ~~HE-~~LTF symbols, indicated in the Number Of HE-LTF Symbols And Midamble Periodicity field or the Number of HE/EHT-LTF Symbols field in the Common Info field, shall not exceed the total number of ~~HE-~~LTFs for the corresponding non-AP STA that it is capable of transmitting, as signaled in the Sensing Capabilities element(#3426).

**11.55.1.5.2.5 TF sounding phase – SR2SR variant**

The format of the SR2SR NDP in the TF sounding phase of a TB sensing measurement exchange shall be an HE Ranging NDP if the SR2SR Sounding Trigger frame is soliciting a HE Ranging NDP, as described in 27.3.18a.1 (HE Ranging NDP). The format of the SR2SR NDP in the TF sounding phase of a TB sensing measurement exchange shall be an EHT Ranging NDP if the SR2SR Sounding Trigger frame is soliciting an EHT Ranging NDP, as described in 36.3.4.1 (EHT Ranging NDP).

~~NOTE—In the SR2SR variant of a TF sounding phase, 320 MHz operation is not supported.~~

The AP shall set the parameters of the SR2SR Sounding Trigger frame as follows:

— The Number of Spatial Streams in the SS Allocation/RA-RU Information field within the Transmitter User Info field shall be less than or equal to aSensingSRRXSTS for the STA addressed by the AID12/USID12 field in each Receiver User Info field and shall be less than or equal to aSensingSRTXSTS for the STA addressed by the AID12/USID12 field within the Transmitter User Info field.

— The SR2SR Rep field in the Transmitter User Info field within the Sensing Sounding Trigger frame shall be set to less than or equal to aSensingSRRXRep for the STA addressed by the AID12/USID12 field in each Receiver User Info field and shall be set to less than or equal to aSensingSRTXRep for the STA addressed by the AID12/USID12 field within the Transmitter User Info field.

— The product of the number of LTF repetitions, indicated in the SR2SR Rep field within the Transmitter User Info field, and the number of ~~HE-~~LTF symbols, indicated in the Number Of HE-LTF Symbols And Midamble Periodicity field or the Number of HE/EHT-LTF Symbols field within the Common Info field, shall not exceed the total number of LTFs the STA addressed by the AID12/USID12 field in each Receiver User Info field is capable of receiving, as signaled in the Sensing Capabilities element, and shall not exceed the total number of LTFs the STA addressed by the AID12/USID12 field within the Transmitter User Info field is capable of transmitting, as signaled in the Sensing Capabilities element.

## SP

Do you support the proposed resolutions to the CIDs and incorporate the text changes into the latest TGbf draft?

Y/N/A